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ABSTRACT

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AREA UNDER CONSTRUCTIVISM: A PILOT STUDY USING A WORLD WIDE WEB HOME PAGE TO ASSESS PROFESSIONAL DEVELOPMENT

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The purpose of this study was to evaluate the potential of World Wide Web Home Page construction as a way for teachers to demonstrate their professional development as they construct new professional knowledge and networks. The focus of this pilot study was to begin looking at the connections to learning that a Home Page can demonstrate without having to train the teacher as a computer programmer. The teacher subjects (n=7) participated in a constructivist-based summer institute to promote excellence in science teaching. The use of and publishing on the Internet were stressed as essential skills of the 20th century science teacher with teacher participants contributing to a collaborative Home Page. Teachers with no Internet experience prior to the institute were able to begin contributing to the collaborative Home Page with less than four hours of Internet "surfing" and thirty minutes of HTML code (the code of the Web) programming instruction.

Introduction

Typical staff development experiences for inservice teachers often consist of the least effective professional diet of "flash and dash" half day or full day events on the latest hot topic or strategy. Many current inservice topics promote constructivist pedagogy, while the actual training experience models a very didactic delivery system. Systemic change is a slow process and cannot be shortened for time's sake. The literature (Etchberger & Shaw, 1992; Joyce, Showers, & Bennett, 1987) is clear that highly effective staff development programs necessitate long term commitment, lasting support for the change process and teacher behavior change, and recognition that change is personal. Also, it is necessary to model the types of behaviors that the professional development programs attempt to instill into the teacher's repertoire -- whether teaching strategies, pedagogical development, or technology integration.

Purpose of the Study

At present, few ways exist to demonstrate or measure professional growth of teachers beyond traditional formats (resumes or vitas) or portfolios. The resume or vita becomes a listing of experiences endured or projects completed rather than experiences internalized and networked with previous learning. The primary purpose of this study was to evaluate the potential of World Wide Web Home Page construction as a way for teachers to demonstrate their professional development as they construct new professional knowledge and networks. A secondary purpose was evaluating the power of modeling technology integration as an integral component of the professional development -- in this case, as one of the assessment activities.

Literature Review

Inservice education includes those learning experiences teachers participate in after entering their teaching career. School districts are largely responsible for inservice planning and typically the programs focus on topics and/or strategies that serve the interests of the school district. Sharma (1982) describes inservice practices by comparing the artificial insemination ("servicing") of Grandpop's old Jersey cow to the inservicing of teachers. "And in the end, like poor old Flossie, we didn't get to join in the act and we didn't have much fun. It just happened" (p. 403). Teacher inservice programs traditionally elaborate content, pedagogy, classroom management, or technical skill using a very didactic, expert driven presentation. A common characteristic of good inservice programs is the focus on the professionalization of the teacher by considering the personal nature of change and including the teacher in the inservice planning (McGrew, 1992; Daresh, 1986; Wade 1984-5).

The State of Texas, through the Texas Education Agency (TEA), has committed to science teachers the support for a long-term professional development focus by the development of regional collaboratives. The Collaboratives' mission is to facilitate student achievement gains by broadening teacher development K. Jbeilly (personal communication, July 20, 1995). The experiences that emerge from the Collaboratives emerge from shared decision making among the stakeholders. Activities necessitate a constructivist methodology to support the development of science teachers who are able to use and work with such methodology and who value the construction of a personalized understanding of the world.

Evaluation of the impact of inservice programs has largely been through the quantification of behaviors or responses to survey questions that neither adequately reflected the ways teachers perceive themselves in relationship to new information nor their professional growth along a professional developmental continuum. More descriptive forms of assessment would be useful in understanding more clearly the way teachers are using their inservice experiences. According to Herman, Aschbacher, and Winters (1992) most forms of alternative assessment share the following characteristics:

- Individuals are asked to perform, create, produce, or do something.
- Tap higher-level thinking and problem-solving skills.
- Use tasks that represent meaningful instructional activities.
- Invoke real-world applications.
- People, not machines, do the scoring, using human judgment.
- Require new instructional and assessment roles for teachers.
- Examines the processes as well as the products of learning (p. 6).

An area that has received much attention as a promising form of alternative assessment has been the portfolio. The value of portfolio assessment is that it represents an entire system of assessment rather than a single assessment (Herman, Aschbacher, & Winters; 1992). The World Wide Web Home Page is constructed with many similarities to a portfolio and takes on the characteristics of an electronic portfolio. A World Wide Web Home Page also represents a comprehensive assessment system rather than a single event. Both the World Wide Web Home Page and the portfolio show complete works, works in progress, and works that may never be completed.

The World Wide Web

The Internet is a collection of interconnected networks that allow information transfer across the entire planet. Until 1991, this information was essentially inaccessible in the classroom. A new segment of the Internet called World Wide Web was developed in France that utilized a "point and click" client/server interface. This interface allows the transfer of text, graphics, sound, and full motion video in a nonplatform specific environment. This is possible through the use of one of several World Wide Web "browsers," such as Netscape©. These browsers allow easy access to the World Wide Web in a "point and click" mode that has become fashionable in both Macintosh and Windows formats. Additionally, many freeware programs (programs that are free and may be loaded with the browser) are available that allow for images, voice, and real-time video conferencing.

The second advantage of the World Wide Web browsers is the ease of construction of personal home pages. The World Wide Web uses an easy to learn programming language called Hyper-Text Markup Language (HTML) to create the author's home page. The main advantage to the Hyper-Text language is that

through a simple programming interface, the user can click on a go to another location on the Web (called a "link"), hear a sound introduction, show a video clip, download freeware programs, or a myriad of other activities on the Internet by simply clicking on a description of the desired activity on a home page. The science teacher can provide "links," to sites on the Web that range from lesson plans to the National Science Standards, to full motion video of an active volcano. They can show short video clips or still pictures of their classroom to reflect their personal professional development. Examples of student projects, field trip plans, scores from the local science Olympiad can all be shown. The home page allows the author to switch from a user of information to an active participant in the global "information age."

Constructivism and the World Wide Web

Constructivism can be defined as ideas, images, and skills that are individually constructed in response to an individuals interaction with their physical and social world (Collette & Chiappetta, 1994). World Wide Web Home Page construction embodies many of the constructivist premises, including construction of understanding in response to the author's interaction with their professional, personal, and social world (Bell & Gilbert, 1994). A Home Page is constructed one piece at a time. One or two ideas quickly become linked to others to create elaborate networks that demonstrate the relationships and patterns the author finds when new information confronts old.

One of the most popular images on the Web is a small yellow sign, "Area Under Construction", followed by an author's apology for the "construction" mess. Home Pages, as is the case with learning, are by nature incomplete – they are works in progress. As the author of the Home Page learns it can be reflected and demonstrated immediately in the Home Page by the schema that develops and the links that are added. This continuos and thoughtful evolution is a

demonstration of learning and understanding. Thus, "Area Under Construction" becomes "Area Under Constructivism" reflecting the individuals professional development. If the teacher writes long, powerful essays on constructivism and student-centered learning but does not include examples of students work or classroom activities reflecting these practices, one could question if they have internalized the ideas and constructs, or have they just done a good job at "doing what they perceive the professor wants."

A second powerful notion that is embodied under the precepts of constructivism is the notion of the transition of the teacher from the sole source of knowledge. In traditional instruction the teacher and the textbook are the sole sources of knowledge. The Internet and the World Wide Web take this sole-source method of teaching and replaces it with the teacher as a facilitator of learning. If teachers are going to "buy-into" the Internet and the World Wide Web, they must give up some of the power of being the sole source of knowledge. If, we are to expect teachers to give up some of this "power," then we as the deliverers of professional development must first model this behavior. This includes providing for student, in this case the teachers, driven assessment. A World Wide Web Home Page reflects just such an evaluation tool. The teacher chooses where to "sacrifice" breadth of coverage for depth of coverage.

Modeling Technology Integration

As we enter the "Information Age," it is imperative that the school culture change to reflect the technological influences on society as a whole. The American Association for the Advancement of Science ,AAAS, in Science for All Americans: Project 2061 (AAAS, 1990) was the first national curriculum project to consider technological literacy to be required for science literacy. The National Research Council, NRC, (NRC, 1996) in cooperation with National Association for Science Teachers, NSTA, have also included technology

integration as a central issue of scientific literacy in the National Science Education Standards.

The general principles of effective professional development say that the higher the level of learner participation, in this case—the science teacher, the more effective the program (Joyce & Showers, 1988; Mohlman-Sparks, 1986). Additionally, before technology can be successfully integrated into the classroom, the teacher must overcome many barriers. The most consistent barrier was the time needed for the teacher to achieve their own personal proficiency before assimilating it in the classroom (OTA, 1994; Hadley & Sheingold, 1993; Becker, 1994). Technology must be modeled in professional development programs as supporting instruction, not replacing instruction (Hooper & Rieber, 1995; Sweeder, 1996). If teachers are going to utilize this new form of information, they must be immersed into the global classroom concept and expand educational practice from didactic, classroom-based instruction to problem-solving based, student-generated learning in open classrooms across the world. Without the pedagogical connection science teachers are unlikely to take advantage of either the Internet, the World Wide Web or staff development on technology integration (Newman & Berstein, 1992; Maor & Taylor, 1995).

Research Design

The teacher subjects (n=7) participated in a constructivist based summer institute to promote excellence in science teaching. Activities conducted during the institute included instruction and experimentation with foundational concepts and principles in chemistry, applications of chemistry to the environment and industry, science safety issues in the public school environment, and development of applications of technology professionally and instructionally. The use of and publishing on the Internet

were stressed as essential skills of the 20th century science teacher. Teacher participants contributed to a collaborative home page. Follow-up sessions focused on continued exploration of the Internet (begun during the two-week institute), group development of strategies for the implementation of Internet into the classroom, and integration of teacher products into the collaborative home page.

The collaborative Home Page was started prior to the institute and was used as "our home" (the beginning place for Web searches) during instruction on searching the Web. The teachers had two products that they were responsible for integrating into the collaborative Home Page. All contributions to the Home Page were facilitated through an experienced Home Page author to ease technophobic fears. With less than four hours of time spent searching the Internet and thirty minutes of instruction on HTML programming (the program language of the Web), the teachers were able to contribute to the collaborative Home Page.

The first project was to convert their final institute projects into a form that they could put out on the Web. The projects, which incorporated concepts, processes, and principles in chemistry and the environment, took varied forms (i.e. an instructional module, search of resources to support a developing instructional module, development of instructional technology, etc.).

The second product was to locate and contribute at least five new "links" for the collaborative Home Page. This process used a template developed by the Home Page administrator that was then e-mailed and added to the collaborative Home Page (Slough & McGrew-Zoubi, 1996). The template reduced the students anxiety over "how to," allowing them to focus on the real assignment—showing the connections that each teacher had made. Additionally, each link included a descriptor used to identify why the teacher chose it. The

links were essential to discerning the mental connections that the teachers were making from the collaborative Home Page to the rest of the Web. The link descriptor and a semi-structured interview were used to evaluate teachers attitudes about "publishing on the Web" and rationale for selection of the links.

A survey was developed to evaluate the teachers experience and comfort level in use of the Internet. A Likert-type scale format measuring the frequency of and attitudes towards teachers previous use of e-mail, World Wide Web searches for information, and student use of World Wide Web searches for information. The survey was administered before the institute and after the second follow-up meeting. Previous teacher use of e-mail and previous experience with "surfing" the Web were seen as precursors to collaboration on the Home Page.

Analysis of Results

No participants had used World Wide Web searches or e-mail prior to the institute for either personal or classroom use. In each case the preliminary results for teacher and student usage of e-mail and World Wide Web searches for information showed increased use. Also, teacher's attitudes toward use of e-mail and World Wide Wed searches showed an improvement.

Initial interviews after the posting of links showed a predominance of links to science content specific locations for student use (i.e., NASA for astronomy) rather than professional development sites for teacher use (i.e., Computer as Learning Partner - a resource for computer integration in the classroom). This was not a major concern, as the teachers themselves recognized that these types links (science content specific) were just a small part of the potential of the World Wide Web. Each teacher, when prompted

during the interview, was able to provide several sites that were more for their personal professional consumption.

The projects that were developed met the expectations of institute faculty for content except for one that was returned to the participant who then completed a satisfactory assignment. The placement of projects on the Internet met with more difficulty. These difficulties involved technical problems as well as what Collingston, et. al. (1994) called fear of failure. The teachers were more reluctant to place their **individual** projects ("someone evaluating their work") on the collaborative page than they were to learning how to place projects on the Web ("learning the process"). Some of the uneasiness waned after the first project was in place. Teachers had a definite sense of accomplishment about their "publishing" on the Web. Projects included a list of 200 activities to conduct at an outdoor education center, a land measurement unit, and a personal Home Page that included a resume'.

Most of the products were produced using multiple formats with paper and scissors cut and paste of commercially prepared curriculum activities prevalent (one of the better projects was typed on a typewriter with extremely good hand-drawn illustrations). These production problems created a problem when trying to place the products on the collaborative Home Page. If the students were more familiar with how Home Page documents were produced, then single digitally formatted production programs could have been used. Many commercially available software packages provide HTML editors that can produce "Web ready" documents. Also, the teachers lost their university computer account at the end of the summer and all of their personal was deleted along with access to the World Wide Web. As school districts become connected, it is hoped that this will cease to be as much of a problem as it was in this study.

Conclusions and Implications

The World Wide Web Home Page meets the requirements of an alternative assessment tool. It definitely shows promise as a means to assess professional development. It shows promise for application to preservice and inservice programs that have as a focus the professional development of teachers. The focus of this initial study was to begin looking at the connections to learning that a Home Page can demonstrate without having to train the teacher as a computer programmer.

Eventually the Home Page has the potential for serving as an evaluation tool. Better defined methods of assigning value to the products of an individuals professional, social, and cognitive growth need to be explored. Possibilities include rubrics, presentation of the Home Page to an evaluator(s), self-evaluation, or even an exit-level project for advanced degrees other than a Ph. D.

Limitations of this study include the small number of teacher participants and lack of complete technical instruction in Home Page programming. In this study the teachers did not have enough exposure or time to develop competencies in programming their own pages - yet they were able to contribute in a meaningful way to the collaborative Home Page. Future studies need to include this instruction - along with the time needed to master the programming skill necessary if the teacher is to be able to construct their own personal Home Page. By its very nature, using a Home Page to chronicle personal professional development will require constant updating as the teacher adds to their professional competencies. It is planned that the pilot will be replicated with a larger N size utilizing both inservice teachers and preservice elementary teachers enrolled in a science methods course the semester before student teaching.

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